Kolomoki Mitigation Bank, Spring Creek Mitigation Area

Third Year Stream Monitoring Report

(Quantitative Analysis)

January 2012 through December 2012

Prepared for:

Kolomoki Farm, LLC
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USACE File Number 200410120

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KOLOMOKI MITIGATION BANK

SPRING CREEK MITIGATION AREA

Third Year Stream Monitoring Report

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I. PROJECT OVERVIEW

ACOE Permit: 200410120

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The Spring Creek Mitigation Area (SCMA) is located near U.S. Highway 27 approximately 3 miles south of Bluffton, and 8.5 miles north of Blakely, Georgia (31°29'2" latitude and 84°51'40" longitude). North of Jack Slayton Road there are approximately 47 acres of wetlands and 20 acres of riparian buffer along Spring Creek that are included in the SCMA as preservation. All enhancement and restoration activities occurred south of Jack Slayton Road (Figure 1, Appendix A). The primary mitigation goal for the SCMA is to restore the original matrix of bottomland hardwood, floodplain forests, cypress/blackgum forests, and streams that existed in the area before the land was managed for agricultural and silvicultural purposes. The primary mitigation action was removal of the dam and culverts on tributaries to Spring Creek, excavation of stream channels on tributaries T1 and T2, and planting of the riparian buffers and wetlands. The stream mitigation included 11,371 linear feet of stream channel restoration through structure improvement/removal, Priority 2 and Priority 4 restoration, and 35,553 linear feet of riparian restoration and preservation.

Site preparation and dam removal was completed in October 2008. Initial planting of riparian trees and shrubs was completed in March 2010. Bare root seedlings were planted at a density of 302 trees per acre (based on percentage of each riparian area planted as per the Army Corps of Engineers 2004 Standard Operating Procedures) along 20,954 linear feet of stream. Buffer widths ranged from 50 to 200 linear feet on either side of the streams. A supplemental planting of 3,000 bare root seedlings occurred in February of 2012 during corrective action measures along T1B and the eastern edge of T3E.

Recommendations in the Y2 report included supplemental planting of hardwood saplings in winter 2012 within the areas previously affected by incidental mowing during nuisance species removal and after completion of the corrective management plan along T1B. In March 2012, supplemental planting of 2,500 hardwood saplings occurred in this area. A decision was made to increase harrowing of the boundary to twice a year. Since thick vegetation was obscuring some of the boundary markers, tall PVC pipes were placed on several of the t-bars.

Year 3 stream monitoring occurred July 23rd through July 26th, 2012 and at macroinvertebrate stations February 26, 2013. Macroinvertebrate sampling had to be shifted due to dry creek channels during the early part of the sampling period. This shift was coordinated with EPD and ACOE. To date, the majority of the SCMA stations are meeting the performance standards set forth by the Final Banking Instrument. While one of the monitoring stations did not

meet Y3 requirements in survival, the overall average of the monitoring stations meets the performance standards set forth by the BI. Recommendations for the SCMA are to continue monitoring the area for success criteria in 2014 (Year 5).

II. MONITORING REQUIREMENTS AND PERFORMANCE STANDARDS

Riparian vegetation monitoring requirements include documentation of vegetation survival, density, species composition, vegetative growth, hydrology, and evidence of wildlife usage during Years 1, 3, 5, and 7 after mitigation implementation (as outlined in the BI). Volunteer trees and shrubs were counted toward the station densities (planted trees were marked and numbered during time of installation so that volunteer species could be added and tracked when appropriate). Volunteer species were counted if they were at least 18" in height**.** Classification of the strata (canopy, subcanopy, shrub, or herbaceous) used standards outlined in the Regional Supplement to the ACOE Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (V 2.0), Nov 2010. Stream channel monitoring for the SCMA includes bank stability, channel morphology, and aquatic life.

The SCMA is reviewed on an annual basis to determine if nuisance/invasive species are a potential threat to the success of the mitigation area. Nuisance vegetation was not counted or measured during the monitoring event since the species are subject to removal.

The Excellent Monitoring Plan also requires reference site comparison monitoring. There is one riparian vegetative reference site established within SCMA (R3). This station is approximately 0.10 acre in size.

Photographs were taken to visually document temporal changes (Appendix C). Approximately 1% of the planted mitigation area was sampled over five riparian monitoring stations. Depending on the community being sampled, station size varied between 0.10 and 0.26 acre. The locations of all current monitoring stations are shown in Figure 2.

Success criteria for the Palustrine Forested mitigation area include a fully stocked diverse stand of trees with adequate growth and survival. If the SCMA is not meeting the success criteria listed in the Banking Instrument (Table 1) contingency actions such as additional planting of hardwood saplings and/or thinning species that may be inhibiting the survival of planted species may be utilized.

III. RESULTS

The success criteria and corresponding monitoring results are summarized in Table 1. The specific categories are discussed in further detail below.

Following the baseline assessment, it was determined that proportionately there are not 302 trees/acre represented at each wetland monitoring station. However, the correct number of trees was planted within each wetland as evidenced by initial planting receipts and documentation. This difference occurred because of random monitoring station selection and a planting schematic calling for cluster grouping.

Thus in order to make the monitoring results comparable to monitoring standards a scaling factor was applied to tree counts from each station. The scaling factor was created by adjusting the number of trees necessary to equal 302 trees/acre. For instance, at baseline MS-1 had 28 trees per 0.26 acre (108 trees/acre). At the required planting density, this station should have had 79 trees. MS-1 was "scaled" by adding another 51 trees so that the results can more easily be compared to the required densities. This scaling factor will remain constant throughout the monitoring of the mitigation bank to facilitate a more accurate comparison from year to year.

A. Sapling Survival and Growth

A total of 427 saplings were installed within the 5 riparian monitoring stations (0.98 acre) and a total of 259 (live) planted and recruited saplings were counted during the third monitoring period. The average scaled density for the SCMA is 389 trees/acre. A complete inventory of planted species is provided in Appendix D.

Monitoring Stations 7, 8, 9, 11, and 13 meet or exceed the Y3 density requirements (225 trees/acre). Bald cypress (*Taxodium distichum*) and oaks (*Quercus* spp.) had the most loss of individuals over the last three years. Significant regeneration of green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), button bush (*Occidentalis cephalanthus*), and bald cypress was observed throughout the SCMA. Currently, there is an average of 1:1 ratio of planted vs. volunteer trees throughout the monitoring stations.

A diverse stand of trees was observed throughout the SCMA. Fifteen tree and shrub species were planted throughout the SCMA riparian restoration/enhancement areas and twenty species were identified (although the species composition changed) during the Y3 monitoring event. Each monitoring station was represented by five to seven different tree species; and the most prevalent species was bald cypress. Green ash, button bush, and swamp tupelo (*Nyssa aquatica*) had the next highest amount of individuals present in the monitoring stations.

Measurements of average height and girth of planted saplings, shown for Year 3 in Table 3, are compared to measurements taken during the Year 1 monitoring period. Average height of trees within all stations has close to doubled during the last three years with MS 7 and MS-9 exceeding the height goal. Station MS-8 is within 83% of the 3-5 year height goal and trees at MS-13 are within 68% of the 3-5 year goal. Average girth of trees has shown an increase and/or stayed the same as previous years.

The reference station (R-3) had at least nine species within the monitoring plot. Ironwood was the most prevalent species in the reference station. This station had an overall density of 300 trees/acre. There was very little herbaceous growth under the heavily shaded plot. There was approximately 1% mortality at R-3.

B. Floodplain Vegetation

Each monitoring station was photographed to document visual assessment of ground cover. These photographs are included in Appendix C. This assessment allows for observation of general trends within a riparian community, nuisance species encroachment, and early discovery of erosion issues. Herbaceous recruitment was prevalent and varied depending on site conditions at monitoring stations. Within the riparian areas there was an abundance of broom sedge (*Andropogon virginicus),* ragweed (*Ambrosia artemisiifolia*), goldenrod (*Solidago altissima*), verbena (*Verbena* spp.), sedge (*Carex* spp.), and various grasses. All monitoring stations had 75% or greater herbaceous vegetation cover and no erosion problems were detected. The reference stations had minimal herbaceous coverage (15%).

C. Rapid Bioassessment Procedure (RBP) Habitat Score

1. Habitat Assessment Score

The results from the RBP scoring are presented in Table 4 and are summarized as follows: Total habitat scores for T1, T2, and T3 were 158, 162.5, and 133.25, respectively and have increased from the baseline assessment. Signs of a more diverse habitat along the restored streams were observed within the channel since the in-stream restoration has occurred. Macrophyte beds (both emergent and submerged plants), root mats, overhanging shrubbery, woody debris, and shallow pools were noted throughout the monitoring reach. Some areas had moderate turbulence along bedrock riffles and stones during periods of high flow. Plants observed within portions of the channel include soft rush *(Juncus effusus*), knotweed (*Polygonum* spp.), and sedge (*Carex* spp.). The large woody debris (primarily cypress) that had been installed along portions of the stream reaches was still in place at time of monitoring. Sand and silt dominate T2 and T3; however, T1 is primarily bedrock substrate.

2. Benthic Sampling

Table 5 shows the overall site index scores for the macroinvertebrate sampling from the Baseline through Year 3 sampling periods. Overall macroinvertebrate site index score for each sampled reach has increased from the previous sampling period and is trending towards the reference data index for the ecoregion (70). Both T1 and T2 have increased from the baseline, 48% and 72%, respectively. T3 is lower than the baseline index; but has increased from the Year 1 sampling period. One negative stress response was observed during analysis of the metrics. T3 showed a decrease from baseline, but an increase from Year 1 sampling.

Table 6 shows the stress response analysis from each sampled reach and compares it to the baseline data. When compared to Year 1 data, T1 and T2 showed a negative response in the Richness/Composition categories; however, when compared to baseline data only T3 shows a negative stress response in the Tolerance/Intolerance Category and the remaining categories for each reach stayed constant or did not show a negative environmental stress response.

3. Fish Sampling

The results of the electroshocking and seining are presented in Table 7 and are summarized as follows: Fish were sampled and recorded at T1 and T3; however T2 was not sampled due to no water within stream. The majority of the fish captured at all sites were generalist/herbivores, with no native sucker, sensitive, or benthic invertivore species present. One fish species/individual was found during sampling of T1, a native sunfish, the green sunfish (*Lepomus cyanellus*) and three species within T3, *Lepomis cyanella*, Eastern mosquito fish, (*Gambusia holbrooki)* and undescribed chub (*Hybopsis* sp.). The IBI score for T1 and T2 was 12.

D. Channel Morphology

1. Physical Parameters

Stability of the stream bank in the restoration and preservation areas was measured by walking the entire length of SCMA to visually observe for sloughing, rills, gullies, bare areas, and undercutting along all restored channels and during cross-sections surveys. Both the right and left banks have varying degrees of vegetative succession. Midstory trees/shrubs and herbaceous grasses have regenerated along all of the slopes of the restored channels creating root stabilization of the soil. No bare areas were observed along the riparian areas. At the confluence of T2 East and West the channel narrows in at this point creating a small headcut. Stream profiles were taken along specific sections of the tributaries in SCMA and are shown in Appendix E.

2. Chemical Parameters

Water quality testing was performed at each of the macroinvertebrate sampling reaches. Data was compared to reference range data to determine overall trends with water quality. Some of the results for T1-T3 were outside of the regional reference ranges (Do, PH, Turbidity, and alkalinity), however, these results are still categorized as optimal conditions for low-gradient streams.

IV. CONCLUSIONS AND RECOMMENDATIONS

To date, the SCMA is meeting the performance standards set forth by the Final Banking Instrument and we are requesting a full credit release for Year 3.

All of the riparian monitoring stations met the success criteria (225 trees/acre) for sapling density. Significant regeneration of riparian saplings and shrubs is occurring within the mitigation areas and has helped the density numbers. The average of 389 trees/acre amongst the

riparian monitoring stations correlates with densities of the mature reference station. The mature reference station (R-3) has a density of 300/acre. It is likely that competition will eventually decrease the total number of individual hard woods present in the stations. However, it is possible as the systems grow over the next two years densities may increase and/or species composition shift.

Monitoring Station 7 had the lowest survival rate (41%) since planting. Survival rates are calculated using total numbers and do not reflect the survival of individual specimens. There was only one dead sapling found at MS 7, the remaining saplings that caused a low density/survival rate were not found. This was likely due to be obscured by thick vegetation. This station is adjacent to canopy and sub-canopy species that are quick growing seed producers and the natural recruitment is high. It is possible that as the saplings grow and successional vegetation decreases, some/all of the missing saplings will be located in the future. MS-7 is located within an area that floods during rain events. Hardwoods saplings that did not meet the criteria for success during Year 3 may likely meet the requirement during Year 5 monitoring. There are no environmental factors that suggest the stations will not meet the Year 5 density target of 150/acre.

The majority of the planted saplings have increased in height over the last three years. Many of these species are initial successors and are designed for quick vertical growth to increase their chance at survival. As anticipated, the slower growing oaks (swamp chestnut oak and red oak) had the least amount of vertical growth. It is likely that these species will continue to obtain rich nutrients from the soil and provide forage and cover for the wildlife.

There was not a significant change in girth of the hardwoods measured in the monitoring stations. Often in hardwood species similar to those planted, girth does not see a significant increase until after the saplings have stabilized with a sufficient root system. At the point when the roots have caught up with the vertical growth, the saplings' girth will make more of a noticeable change. In addition, girth is measured in set increments (0.1, 0.25, 0.50, etc.) and minor changes are not easily recorded with the calipers being used. Girth numbers are also affected by the increase of species in a monitoring station due to natural recruitment or the loss of species.

The hardwood species composition ranged from five to seven species at the monitoring stations. The reference station had nine tree species present. Although there were two stations with black willow present, these individuals were not in sufficient quantity to warrant a remedial action plan. Black willow is a common plant in successional areas and does not typically eliminate other desirable competing wetland species. Species present are representative of local native hardwood systems and no one or two tree species dominate the mitigation site. Upon maturity, the trees present will provide suitable forage and shelter to fauna.

There was sufficient herbaceous cover and stable soil types to minimize any potential erosion possibilities. Because the monitoring stations are lacking canopy at this time, the herbaceous layer is diverse and representative of a successional community. The past land use, dry conditions, and available seed source supported plentiful communities of golden rod (*Solidago* spp.), dog fennel (*Eupatorium* spp.), grasses, and sedges. Over time, this stratum will change with increasing shade. Minimal herbaceous coverage was observed within the reference stations. The dense canopy cover shades out most herbaceous species.

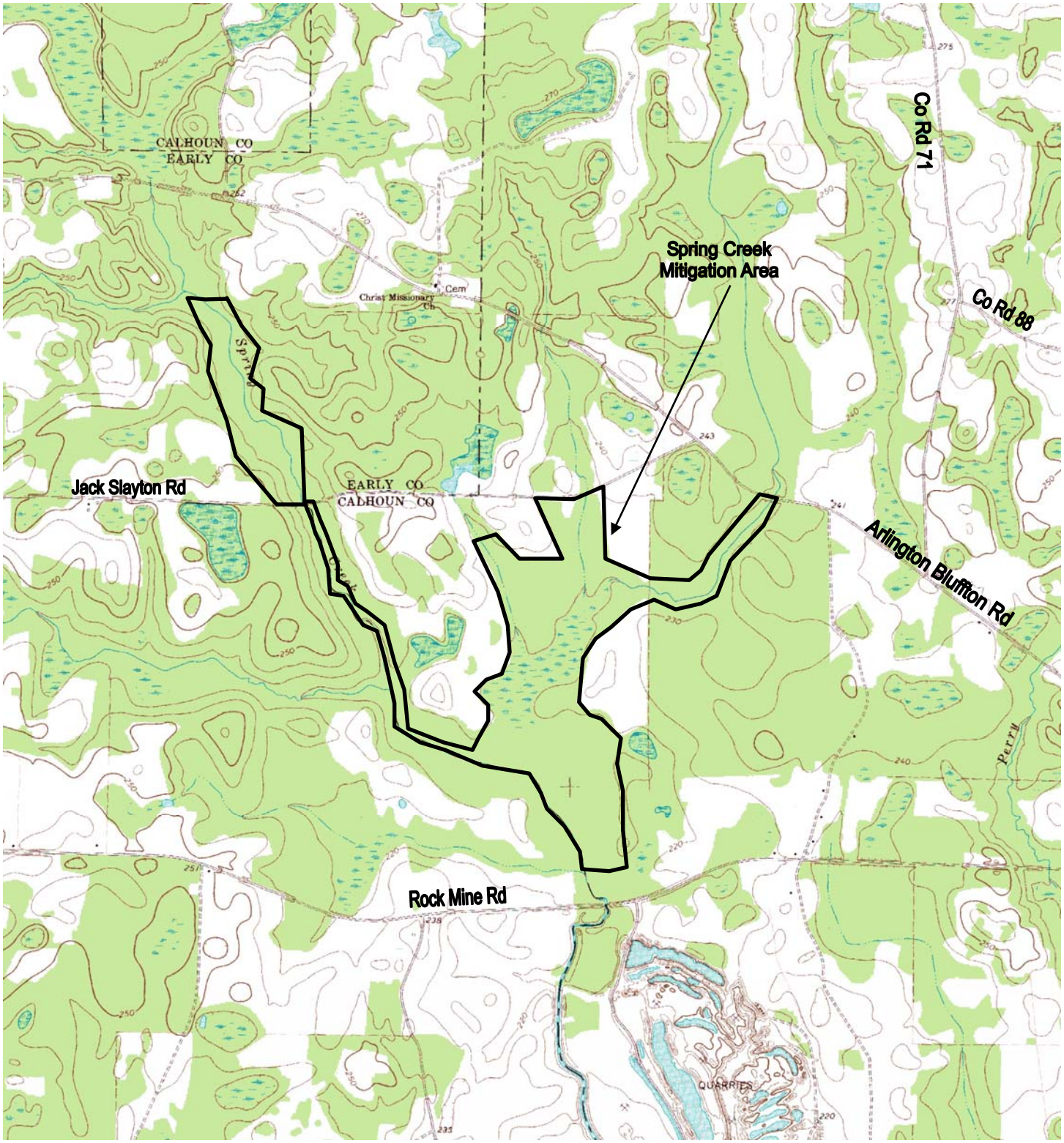
The habitat assessment scores continued to increase from the baseline assessment. Although the vegetation layer along the riparian corridor is still within the successional stage, increased habitat along the riparian channels was observed. This increased habitat has likely been a positive factor in improving the macroinvertebrate index within the reaches. Low IBI scores were calculated for the restored streams. This indicates a very poor quality and can be expected during this successional stage. It is aniticapated that once normal water levels return and the planted hardwoods mature, the IBI score will improve. There was little to no water within the channels at time of sampling. It is recommended that fish sampling occur again during Year 5 early in the monitoring season.

While some of the chemical parameters are still outside of the reference range, the parameters are still considered within optimal conditions. Most fall within the EPA's national patterns of surface water results for chemical parameters. No abrupt changes (signifying environmental concerns or offsite discharges) were observed during water quality calculations.

This report provides data for future comparison and evaluation of mitigation success. It is expected that with further monitoring, the progression of the enhancement and restoration areas into diverse, healthy, functioning wetland systems will continue to progress. Monitoring should continue in Year 4 and there are no contingency plans proposed at this time.

APPENDIX A

FIGURES



SOURCE: USGS Bancroft Quadrangle, 1973

CONSOLIDATED RESOURCES LLC

Figure 1
Location Map

Not To Scale

Kolomoki Mitigation Bank
Spring Creek Area

2029 5TH Avenue
Columbus, Georgia 31904
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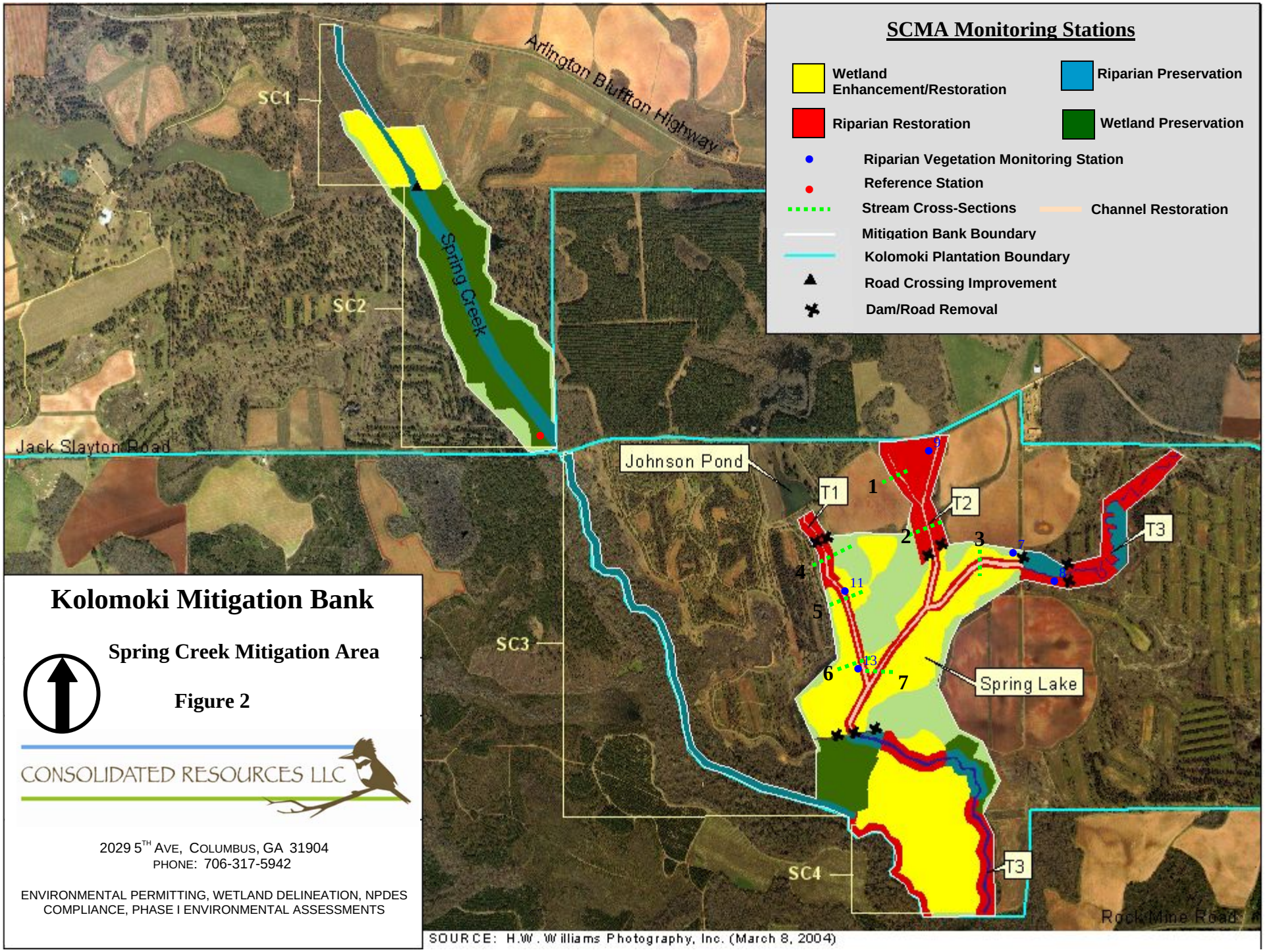

Kolomoki Mitigation Bank

Spring Creek Mitigation Area

Figure 2

CONSOLIDATED RESOURCES LLC

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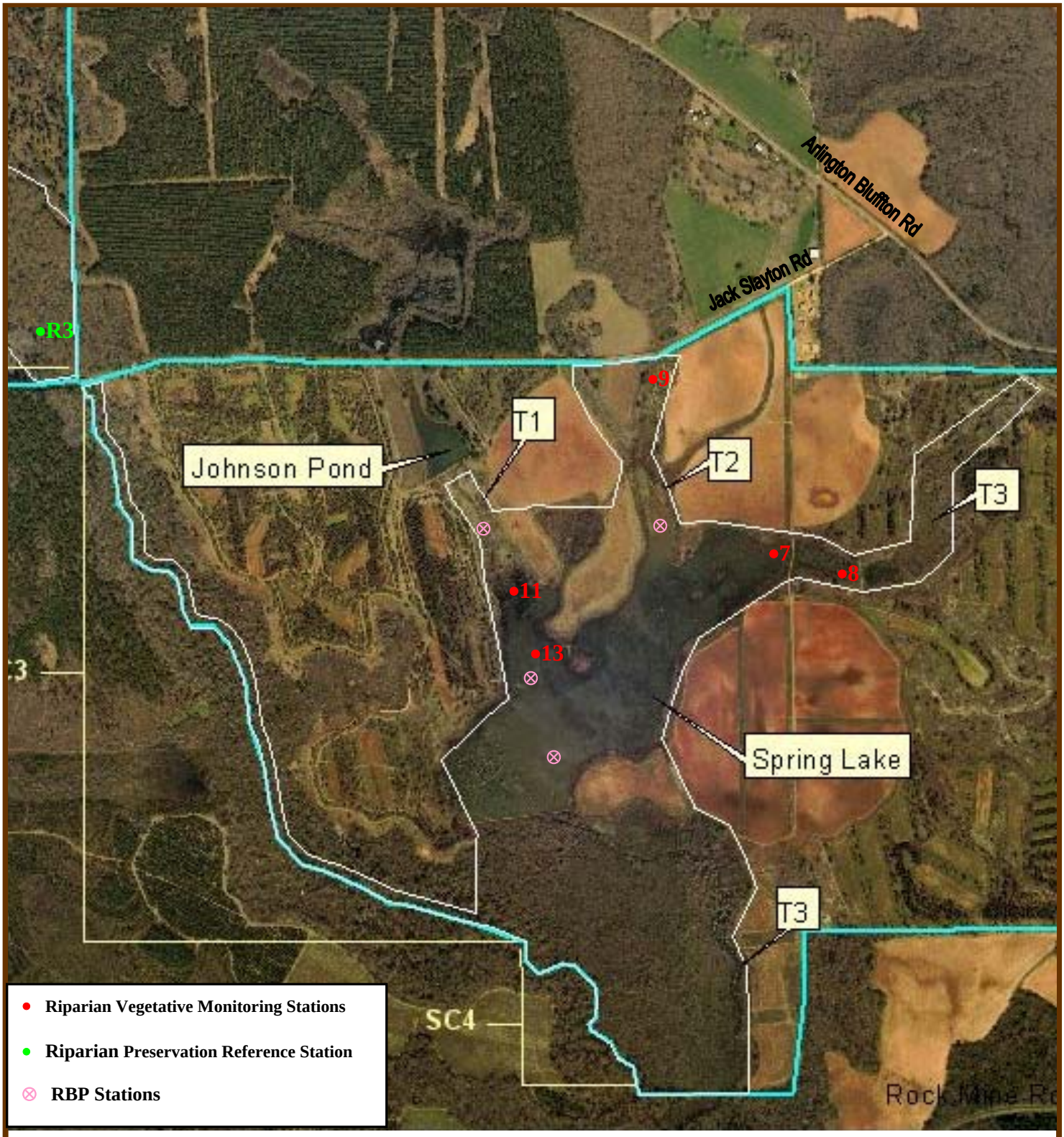
ENVIRONMENTAL PERMITTING, WETLAND DELINEATION, NPDES COMPLIANCE, PHASE I ENVIRONMENTAL ASSESSMENTS



SOURCE: Google Earth

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Figure 3
Monitoring Station Locations

Not To Scale

Kolomoki Mitigation Bank
Spring Creek Area

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APPENDIX B

TABLES

Table 1. Success Criteria and Project Results for 2012

Category	Success Criteria	2012 Results (Year 3)
Sapling Survival	- Y3 goal 225 trees/acre -125 trees/acre at end of 7 years (25%)	-Avg. 389 trees/acre* -5 stations exceed Y3 goal
Sapling Growth	-Double in height in 3-5 years -Noticeable positive change in girth	-2 stations met or exceeded goal height goal. -3 stations trees that are 65-99% of height goal. -4 stations showed a positive change in girth, MS-13 remained constant.
Floodplain Vegetation	-Floodplain vegetation will increase towards 75% ground cover	Herbaceous ground cover is 75% or greater
RBP Habitat Score	-Show consistent improvement towards reference reach parameters -Benthic Score -Fish Sampling	-T1 thru T3 habitat scores showed consistent improvement from baseline scores -Benthic Scores have slightly increased from Year 1 monitoring. -Fish Scores for T1 and T3 indicate poor stream conditions T2 was not sampled due to lack of water
Stream Profiles	-7 Year goal is to achieve stable stream profiles -Physical, chemical, and biological parameters within the restoration areas will show that the systems are returning to a stable system	Chemical and biological parameters are trending towards the reaches returning to a stable system

*Adjusted Density Results see below for explanation

Table 2. Density for Species by Station

Riparian Monitoring Stations	Number Planted Baseline	Scaling Factor	Counted 2012 Y1	Scaled 2012 Y1	Plot Size (acre)	Density Trees/Acre	Meets Success Criteria Y/N
MS-7	56	0	23	N/A	.1	230	Y
MS 8	29	50	40	90	.26	346	Y
MS 9	17	13	24	37	.1	370	Y
MS 11	177	0	87	N/A	.26	334	Y
MS 13	148	0	85	N/A	.26	327	Y
TOTAL	**427**	--	**259**	**382**	**0.98**	**389**	

*Tree count exceeds original number planted due to volunteer species counted towards success.
Note: Adjusted by adding trees per station as described in Section III

Table 3: Average Growth Measurements of Saplings

Monitoring Station	2010 Avg. Height (feet)	2012 Avg. Height (feet)	Avg Change in Height (feet)	2010 Avg. Girth (inches)	2012 Avg. Girth (Inches)	Avg Change in Girth (inches)
MS 7	1.95	4.00	+2.05	.25	.26	+0.01
MS-8	2.86	4.75	+1.89	.25	1.1	+0.85
MS 9	2.87	5.71	+2.84	.25	.40	+0.15
MS 11	1.52	2.39	+0.87	.25	.27	+0.02
MS 13	1.56	2.11	+0.55	.25	.25	+0.00

Table 4: Habitat Assessment Scores

	Habitat Parameters/(Ideals)	Reference Range	Baseline			2012		
			T1	T2	T3	T1 Lower	T2 East	T3 West
Catchment Landuse	Natural	53.7-61.6	20	20	20	20	20	20
	Agriculture	23.4-36.5	80	80	80	80	80	80
	Silviculture	2.5-8.3	0	0	0	0	0	0
	Urban	5.4-6.7	0	0	0	0	0	0
Habitat	**Total Habitat Score (200)**	**141-171.7**	**95**	**69**	**0**	**158**	**162.5**	**133.25**
	Bottom Substrate/Cover (20)	15-18	13.5	5	0	18.5	17.5	17.5
	Pool Substrate (20)	14-17	0	0	0	16	17.5	16
	Pool Variability (20)	10-16	0	0	0	8.5	7.5	8.75
	Channel Alteration (20)	15-16	4.5	6	0	17	18.5	18
	Sediment Deposition (20)	14-17	20	20	0	19.5	15.5	17.25
	Channel Sinuosity (20)	12-15	0	0	0	5	9	9.5
	Channel Flow Status (20)	14-18	15	1	0	20	20	20
	Bank Vegetative Protection							
	Left Bank (10)	4-9	8	5.5	0	6.75	8.5	8.25
	Right Bank (10)		8	5.5	0	6.75	8.5	7.75
	Bank Stability							
	Left Bank (10)	7-9	9	9		10	10	10
	Right Bank (10)		9	9	0	10	10	10
	Riparian Vegetative Zone							
	Left Bank (10)	8-9	4	4	0	10	10	10
	Right Bank (10)		4	4	0	10	10	10
In Stream Habitat (Substrate)	Silt/Clay	0-30.1	--	--	--	0	41	85
	Sand	49.5-69.9	--	--	--	0	47	11
	Gravel/Pebble	0-30.5	--	--	--	33	12	4
	Cobble	0-3.9	--	--	--	0	0	0
	Boulder	0-1.9	--	--	--	0	0	0
	Bedrock	0	--	--	--	67	0	0

Table 5: Site Index Scores for Macroinvertebrate Sampling

Reach	Baseline Index Score	Year 1 Index Score	Year 3 Index Score	Change from previous monitoring year	Changes from Baseline Samping
T1	24	42	49	+7	+25
T2	36	43	50	+7	+14
T3	37	20	27	+7	-10

Table 6: Metric Category Stress Response Analysis

Metric Category	Metric	T1 Baseline	T1 Year1	T1 Year3	T2 Baseline	T2 Year1	T2 Year3	T3 Baseline	T3 Year1	T3 Year3
Richness	EPT Taxa	0	4	0	2	5	3	0	0	0
Composition	% Oligochaeta	0	0	0	0	0	0	0	0.471	0
	% Intolerant	0	2.09	0	1.86	0	2.95	0	0	0
Tolerance/Intolerance	HBI	7.27	6.90	6.29	7.2	6.46	5.46	6.03	7.52	7.2
Functional Feeding Group	Filterer Taxa	1.0	4.0	4.0	3.0	2.0	3.0	1.0	0	1.0
Habit	Clinger Taxa	0	1.0	5.0	2.0	2.0	3.0	1.0	0	1.0

Table 7: Fish Community IBI Metric Values and Total Scores

		T1		T2		T3	
Metric Category	**Metrics**	**Score**	**Value**	**Score**	**Value**	**Score**	**Value**
Richness/ Composition	Total # of native fish species	1	1			3	1
	Total # of benthic invertivore species	0	1			0	1
	Total # of native sunfish species	0	1			1	1
	Total # of native insectivorous cyprinid species	0	1			1	1
	Total # of native round-bodied sucker species	0	1			0	1
	Total # of sensitive species		1				1
Trophic Composition and Dynamics	Evenness	1	1			1	1
	% of individuals as *Lepomis*	0	1			14	1
	% of individuals as insectivorous cyprinids	0	0			0	1
Fish Abundance and Condition	% of individuals as generalists/herbivores	100	1			29	1
	% of individuals as benthic fluvial specialist	0	1			0	1
	# of individuals collected per 200 meters	3	1			7	1
	% of individuals with external anomalies (DELTS)	0	1			0	1
Total Integrity Class		**12**		**(**)**		**12**	

****Site not sampled due to lack of water**

Table 8: Water Quality Results

	Habitat Parameters/(Ideals)	**Regional Reference Range**	**Year 1**			**Year 3**		
			T1	**T2**	**T3**	**T1**	**T2**	**T3**
Chemistry (in situ)	Water Temperature (°C)	--	18	18	17	14	13.5	13.3
	Conductivity (mS/cm)	0.052-0.40	0.06	0.55	0.61	0.058	0.062	0.067
	Dissolved Oxygen (mg/l)	7.6-9.7	6.9	6.7	7.9	7.6	10.45	9.5
	pH (SU)	6.6-7.4	7.0	6.5	6.7	6.5	7.5	7.5
	Turbidity (NTU)	3.4-15.6	6	12	2	11	19	16
	Alkalinity (mg/l as CaCO3)	13.4-176.0	19	24	30	35	45	200
	Hardness (mg/l as CaCO3)	22.2-196.9	23	27	39	40	40	60

APPENDIX C

SITE PHOTOGRAPHS

Kolomoki Mitigation Bank
Spring Creek Construction Photos
January 2012 through May 2012

Photo 1: Standing at the northern section of T1B overlooking newly worked channel, facing downstream (early January 2012).

Photo 2: Standing at T1B after initial construction work along meander, facing downstream (early January 2012).

Photo 3: Standing at the right bank of T1-B overlooking the meander apex, facing upstream (January 30, 2012).

Photo 4: Survey stake placed at point of bedrock within streambed (January 30, 2012).

Photo 5: Survey stakes placed at head of T1B identifying point of slightly higher elevation and where additional work will be done (January 30, 2012).

Photo 6: Small riffle located within T1-B after final construction (February 2012).

Kolomoki Mitigation Bank
Spring Creek Construction Photos
January 2012 through May 2012

Photo 7: T1-B the day before bare-root seedlings are planted (February 2012).

Photo 8: Bare-root seedlings being unloaded at the Kolomoki Farm office (March 2012).

Photo 9: Bare-root seedlings being sorted for staging of areas (March 2012).

Photo 10: Workers assembling for plant installation (March 2012).

Photo 11: Bare-root seedlings being identified for baseline monitoring after planting of area (March 2012).

Photo 12: Upper T1-B after construction and planting with herbaceous vegetation growing within the riparian buffer (May 2012).

Kolomoki Mitigation Bank
Spring Creek Construction Photos
January 2012 through May 2012

Photo 13: Lower T1-B after construction and planting with herbaceous vegetation growing within the riparian buffer (May 2012).

Photo 14: Stair-step riffle area within T1-B (May 2012).

Photo 15: Lower section of T1-B with pointbar and herbaceous vegetation, but with less rocky substrate (May 2012).

Kolomoki Mitigation Bank
Spring Creek Monitoring Photos
July 2012-August 2012

Photo 16: Standing within MS-6, facing north.

Photo 17: Standing within MS-6, facing south.

Photo 18: Standing within MS-6, facing east.

Photo 19: Standing within MS-6, facing west.

Photo 20: Standing within MS-8, facing north.

Photo 21: Standing within MS-8, facing south.

Kolomoki Mitigation Bank
Spring Creek Monitoring Photos
July 2012-August 2012

Photo 22: Standing within MS-8, facing east.

Photo 23: Standing within MS-8, facing west.

Photo 24: Standing within MS-9, facing north.

Photo 25: Standing within MS-9, facing south.

Photo 26: Standing within MS-9, facing east.

Photo 27: Standing within MS-9, facing west.

Kolomoki Mitigation Bank
Spring Creek Monitoring Photos
July 2012-August 2012

Photo 28: Standing within MS-11, facing north.

Photo 29: Standing within MS-11, facing south.

Photo 30: Standing within MS-11, facing east.

Photo 31: Standing within MS-11, facing west.

Photo 32: Standing within MS-13, facing north.

Photo 33: Standing within MS-13, facing south.

Kolomoki Mitigation Bank
Spring Creek Monitoring Photos
July 2012-August 2012

Photo 34: Standing within MS-13, facing east.

Photo 35: Standing within MS-13, facing west.

Photo 36: Standing within Reference Station R-3, facing north.

Photo 37: Standing within Reference Station R-3, facing south.

Photo 38: Standing within Reference Station R-3, facing east.

Photo 39: Standing within Reference Station R-3, facing west.

Kolomoki Mitigation Bank
Spring Creek Monitoring Photos
July 2012-August 2012

Photo 40: Standing within T1-Lower, overlooking dry channel and woody debris.

Photo 41: Standing within T1-Upper, overlooking portion of channel with flow.

APPENDIX D

PLANTING INDEX

Appendix D
Planting Index
Tree Species Planted throughout the SCMA

Scientific Name	Common Name
Betula nigra	Riverbirch
Carya aquatica	Water hickory
Cephalanthus occidentalis	Buttonbush
Cornus florida	Flowering dogwood
Diospyrus virginiana	Common persimmon
Fraxinus pennsylvanica	Green ash
Magnolia grandiflora	Southern magnolia
Nyssa aquatica	Water tupelo
Nyssa biflora	Swamp tupelo
Persea borbonia	Red bay
Prunus angustifolia	Chickasaw plum
Quercus alba	White oak
Quercus falcata	Southern red oak
Quercus laurifolia	Laurel oak
Quercus lyrata	Overcup oak
Quercus michauxii	Swamp Chestnut oak
Quercus nigra	Water oak
Quercus nuttallii	Nuttall oak
Quercus pagoda	Cherry Bark oak
Quercus phellos	Willow oak
Quercus shumardii	Shumard oak
Taxodium distichum	Bald cypress

APPENDIX E

WILDLIFE UTILIZATION

Scientific Name	Common Name
Amphibians/Reptiles	
Agkistrodon piscivorus	eastern cottonmouth[1]
Alligator mississippiensis	American alligator[1]
Anolis carolinensis	green anole[1]
Chelydra serpentina	snapping turtle[1]
Coluber constrictor priapus	southern black racer[1]
Crotalus adamanteus	eastern diamondback rattlesnake[1]
Crotalus horridus	timber rattlesnake[1]
Elaphe obsolete spiloides	Grey rat snake[1]
Hyla cinerea	green tree frog[1]
Hyla versicolor	gray treefrog[1]
Nerodia sipedon pleuralis	Midland water snake[1]
Opheodrys vernalis	rough green snake[1]
Rana catesbeiana	American bullfrog [1,2]
Rana uticularia	southern leopard frog[1]
Regina septemvittata	queen snake[1]
Sceloporus undulatus	eastern fence lizard[1]
Terrapene carolina carolina	eastern box turtle[1]
Trachemys scripta scripta	yellowbelly pond slider[1]
Birds	
Agelaius phoeniceus	red-winged blackbird[1,2]
Ardea alba	great egret[1]
Ardea herodius	great blue heron[1]
Buteo jamaicensis	red-tailed hawk[1]
Cardinalis cardinalis	northern cardinal [1,2]
Cathartes atratus	black vulture[1]
Cathartes aura	turkey vulture[1]
Circus cyaneus	northern harrier[1]
Colaptes auratus	northern flicker[1,2]
Colinus virginianus	bob-white quail [1,2]
Corvus americana	American crow [1,2]
Cyanocitta cristata	bluejay [1,2]
Haliaeetus leucocephalus	bald eagle[1]
Melanerpes carolinus	red-bellied woodpecker[1]
Mimus polyglottos	northern mockingbird[1]
Mycteria americana	wood stork[1]
Pandion haliaetus	osprey[1]
Picoides pubescens	downy woodpecker[1,2]
Pipilo erythrophthalmus	eastern towhee[1,2]
Sayornis phoebe	eastern phoebe[1]
Sialia sialis	eastern bluebird[1,2]
Spizella passerina	chipping sparrow[1,2]
Spizella pusilla	field sparrow[1,2]
Strix varia	barred owl[1,2]
Thryothorus ludovicianus	Carolina wren[1]
Vireo griseus	white eyed vireo[2]
Zenaida macroura	mourning dove[1,2]

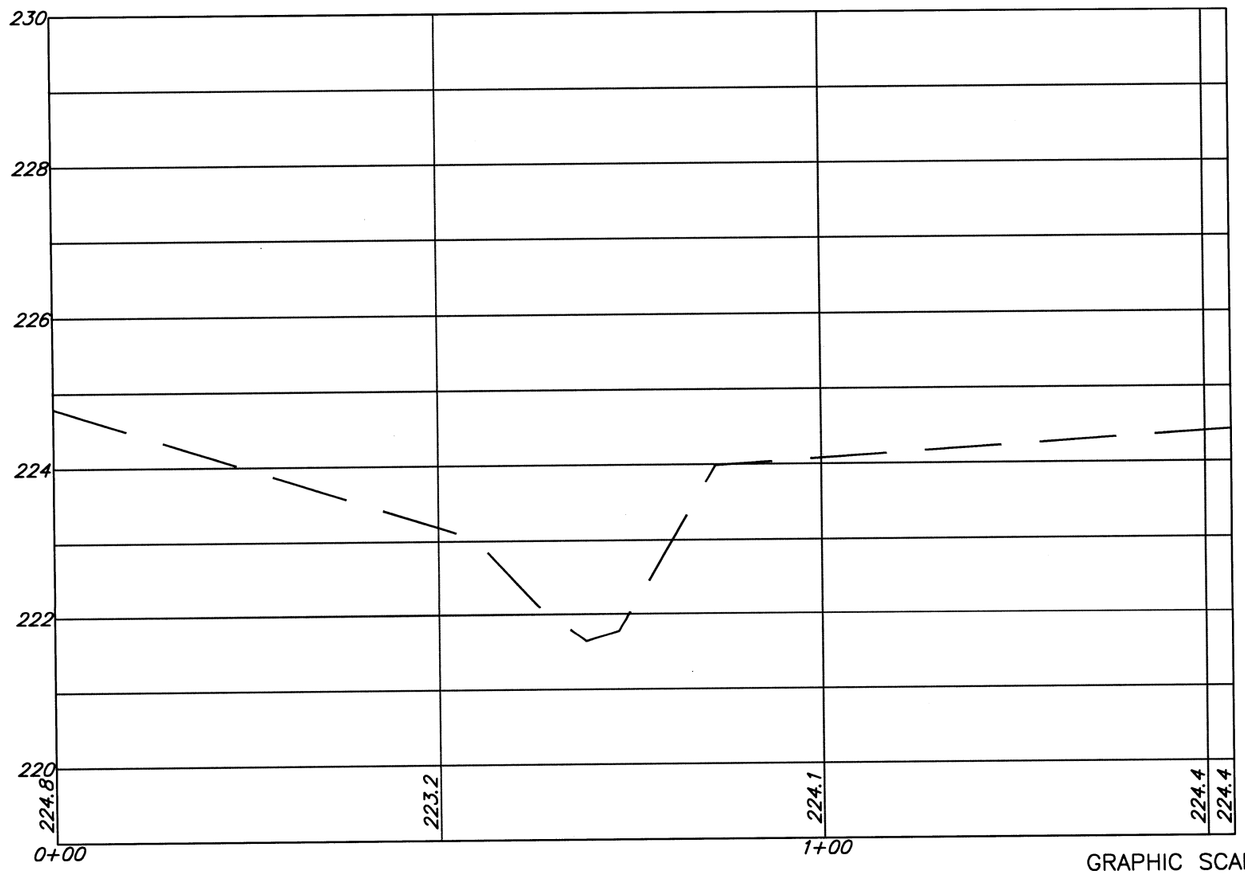
Invertebrates	
Acheta domestica	field cricket
Acrididae	grasshopper
Anax junius	green darner
Apis mellifera	honeybee[1,2]
Argiope aurantia	black and yellow argioper[1]
Biorhiza pallida	gall wasp[1]
Cambarus spp	crayfish[1]
Coccilidae spp.	ladybug[1]
Culicidae spp.	mosquito[1]
Dasymutilla occidentalis	velvet ant
Diptera	gnat[1]
Dytiscus spp.	diving beetle[1]
Erythroneura comes	scarlet and green leafhopper
Gasteracantha elipsoides	crablike spiny orb weaver[1]
Gerris remigis	common water strider
Ixodidae	tick
Leptoglossus phyllopus	leaf-footed beetle[1]
Lycosidae	wolf spider[1]
Nephila clavipes	golden-silk spider
Pachydiplax longipennis	Swift long-winged skimmer
Papilio glaucus	Eastern tiger swallowtail[1]
Papilio troilus	spicebush swallowtail[1]
Phoebis sennae	cloudless sulphur
Photinus pyralis	firefly
Polistes carolina	red wasp[1]
Solenopsis geminata	fire ant[1]
Tetragnatha laboriosa	long -jawed orb weaver
Tipula spp.	crane fly
Vespula spp.	yellow jacket[1]
Mammals	
Canis latrans	coyote[3]
Didelphis virginiana	Virginia opposum[3]
Felis rufus	bobcat[3]
Odocoileus virginianus	white-tailed deer[3]
Procyon lotor	common raccoon[3]
Sciurus carolinensis	eastern gray squirrel[1]
Sciurus niger	eastern fox squirrel[1]
Sigmodon hispidus	hispid cotton rat[1]
Sylvilagus floridanus	eastern cottontail[1]
Sylvilagus palustris	marsh rabbit[3]

[1]Visual, [2]Audible, [3]Tracks/Scat

APPENDIX F

STREAM CROSS SECTIONS

SPRING CREEK CROSS-SECTION ONE

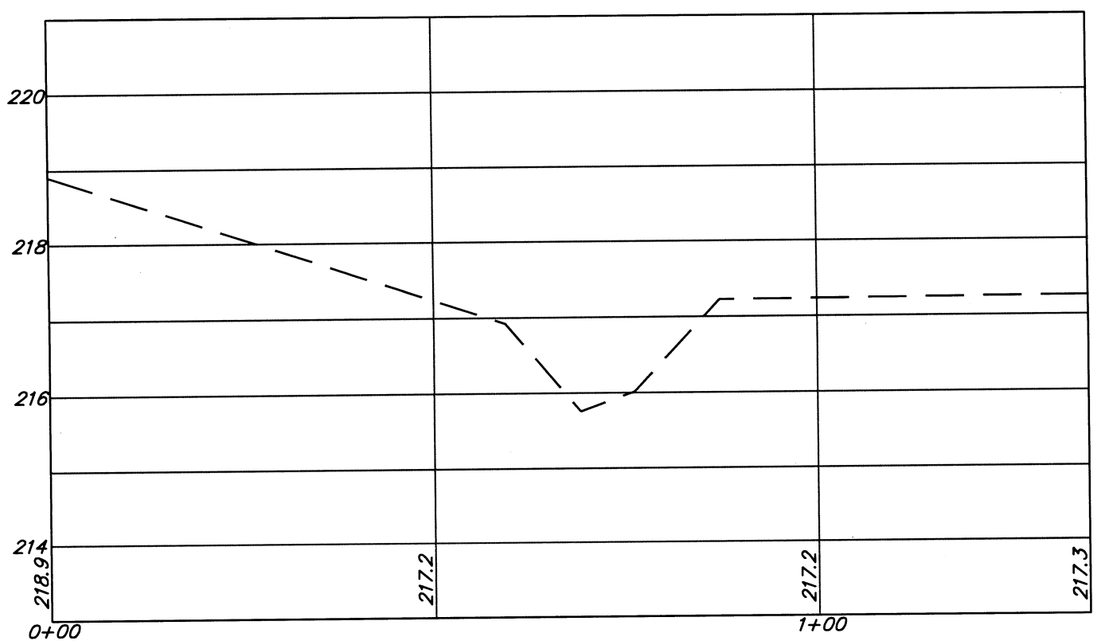


GRAPHIC SCALE

0 10 20 40

SCALE:1" = 20'

SPRING CREEK CROSS-SECTION TWO



GRAPHIC SCALE

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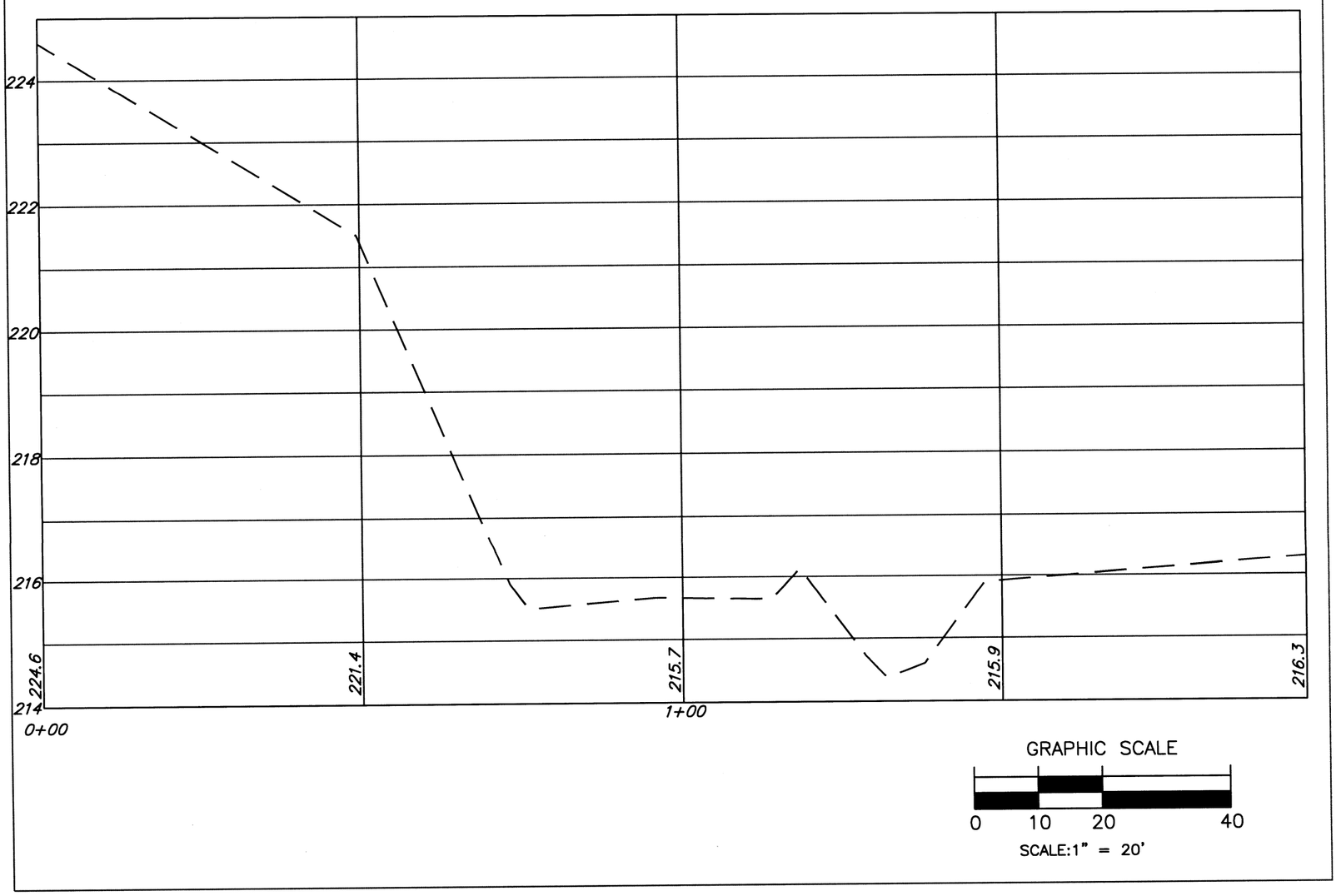
SCALE:1" = 20'

SPRING CREEK CROSS-SECTION THREE

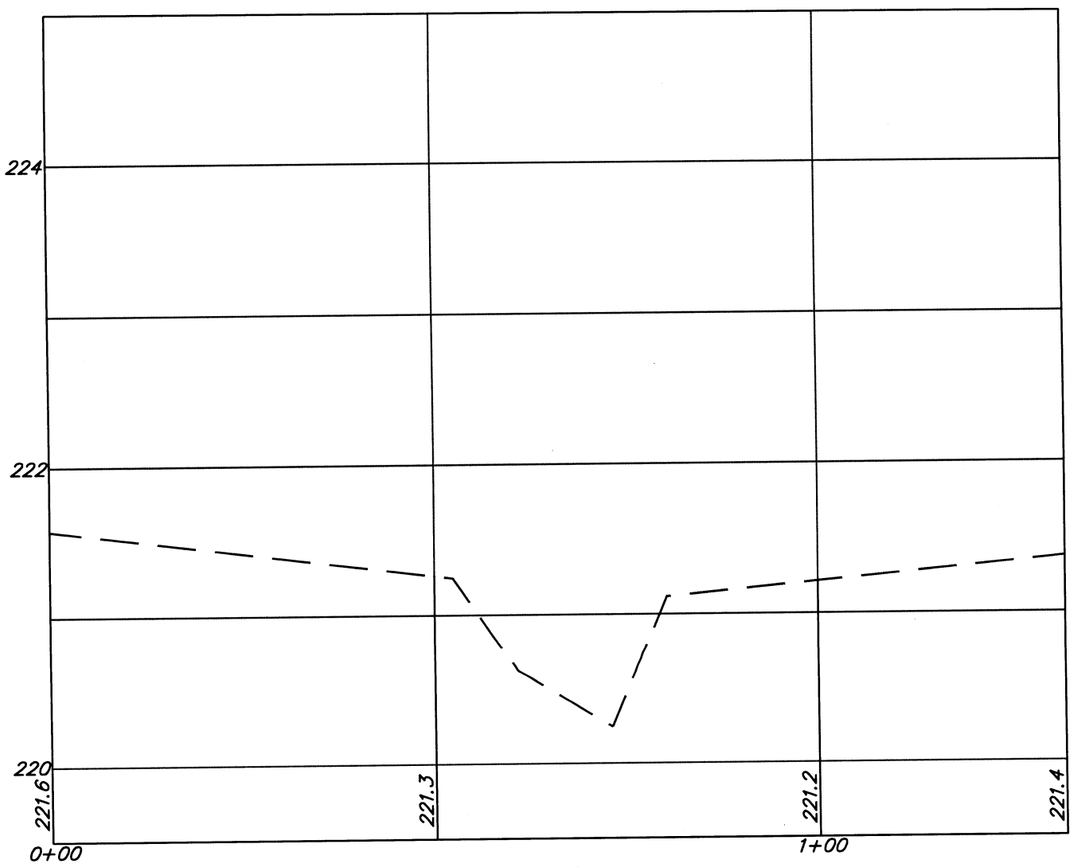


GRAPHIC SCALE

0 10 20 40

SCALE:1" = 20'

SPRING CREEK CROSS-SECTION FOUR



GRAPHIC SCALE

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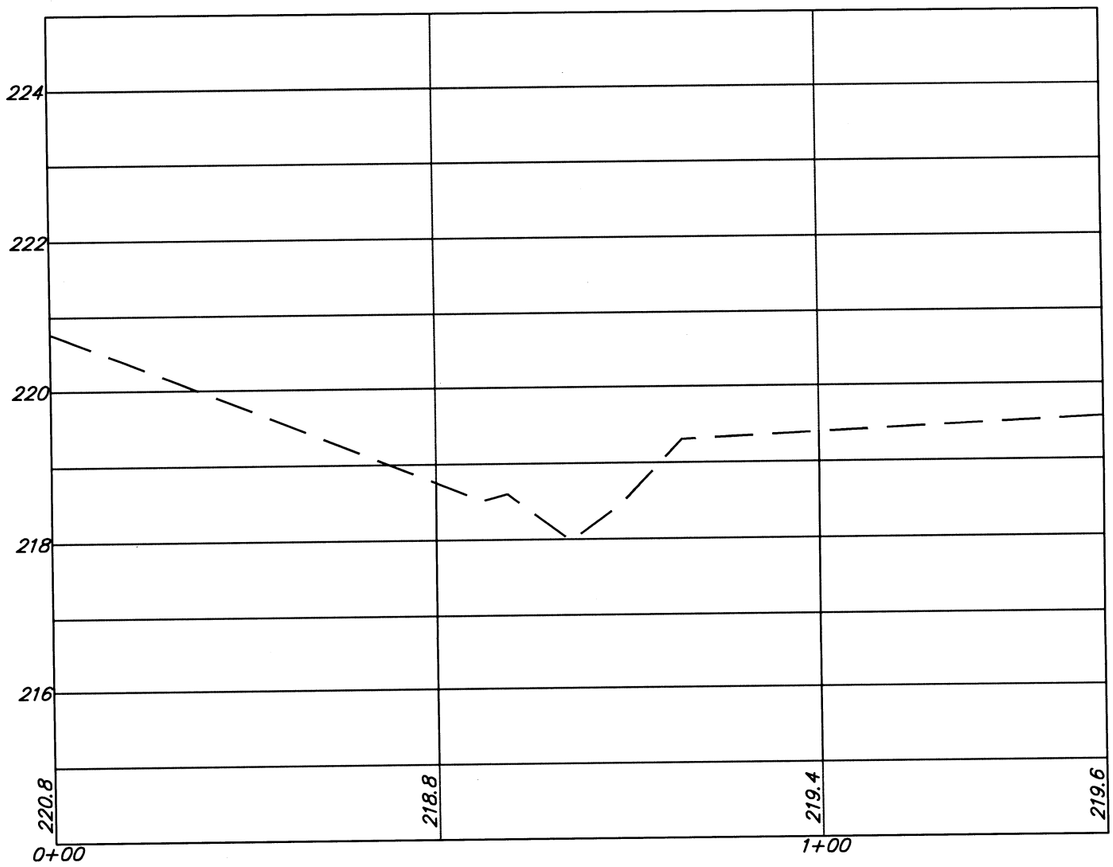
SCALE:1" = 20'

SPRING CREEK CROSS-SECTION FIVE



GRAPHIC SCALE

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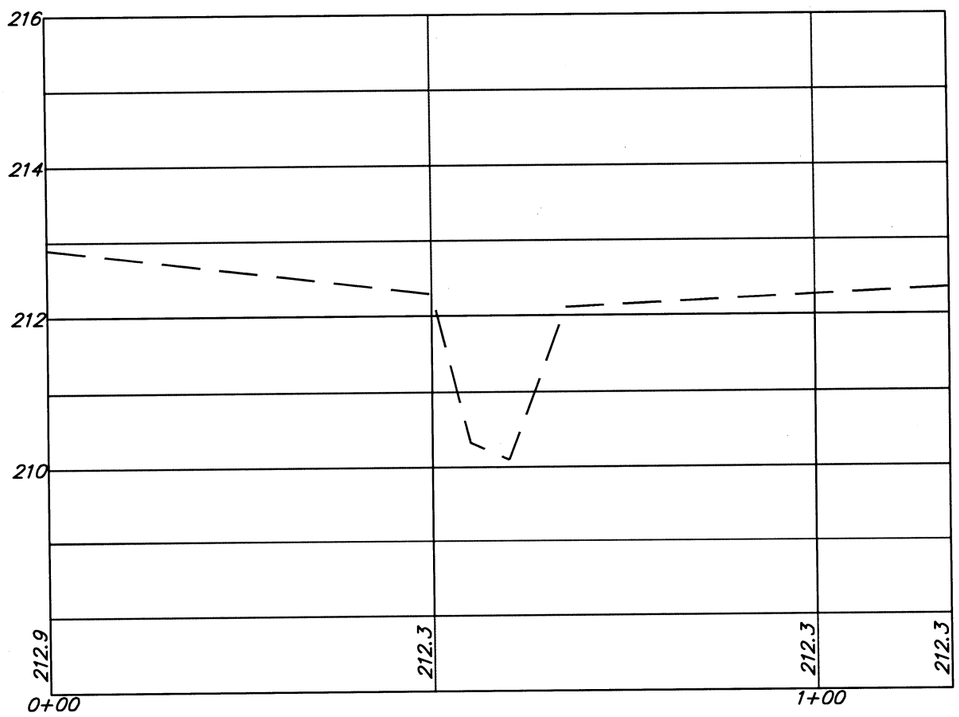
SCALE:1" = 20'

SPRING CREEK CROSS-SECTION SIX

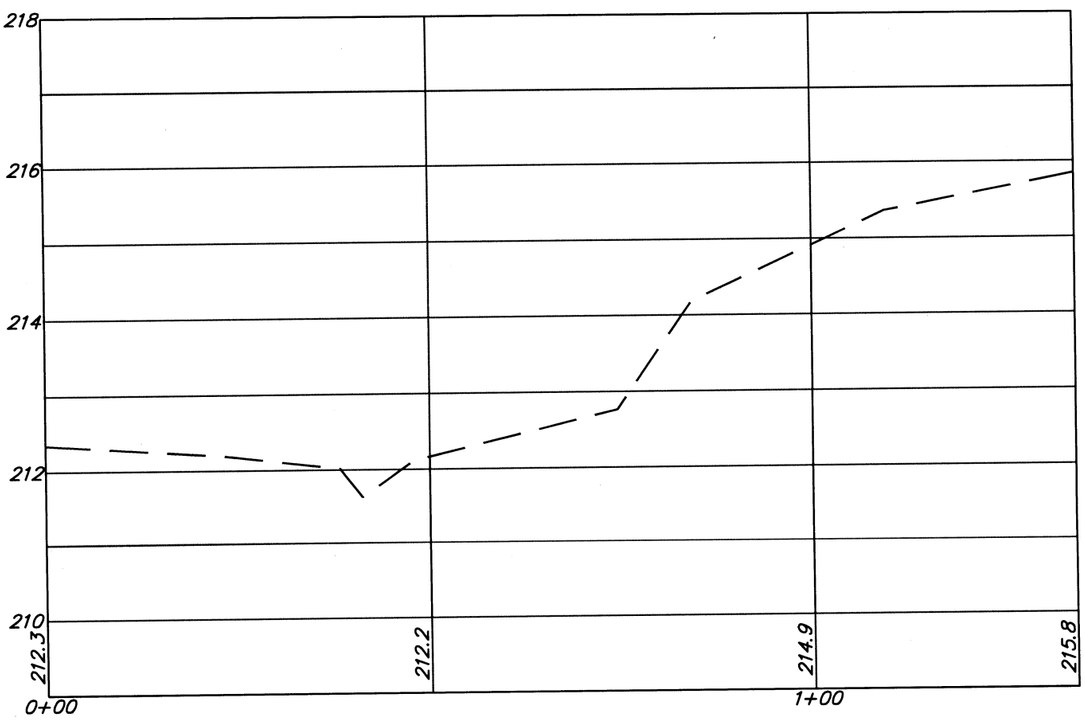


GRAPHIC SCALE

0 10 20 40

SCALE:1" = 20'

SPRING CREEK CROSS-SECTION SEVEN



GRAPHIC SCALE

0 10 20 40

SCALE:1" = 20'